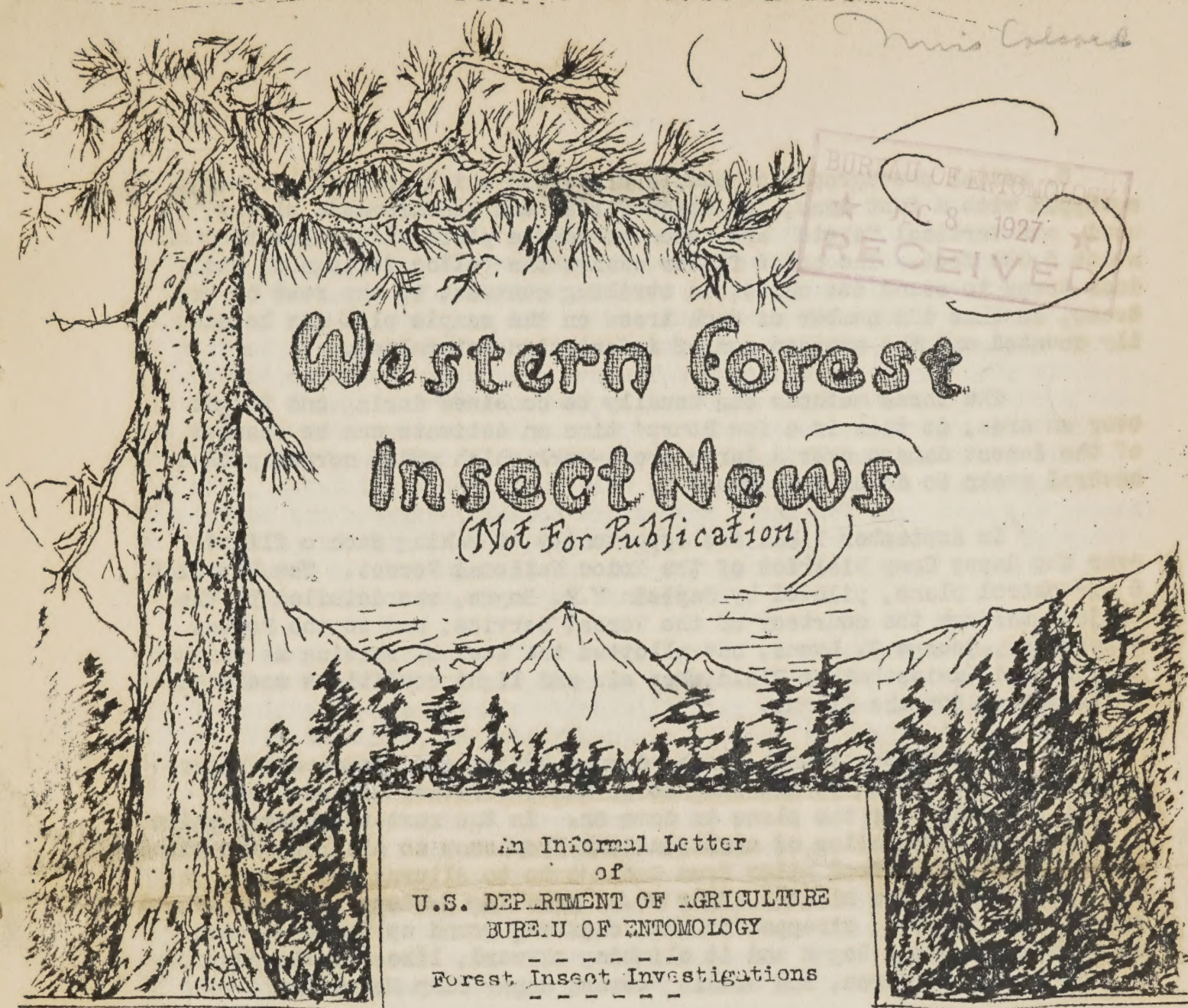


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An Informal Letter
of
U.S. DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY
Forest Insect Investigations

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SHOOTING BUGS FROM THE AIR
by F.P. Keen

Forest entomologists, keeping pace with the times, have already found many ways in which the airplane can be used in dealing with forest insect problems. Chief among these is in connection with extensive surveys of large areas of infested timber. Several flights over western forests have been made recently, and the technique of making insect surveys from the air has been fairly satisfactorily worked out. There are three general methods that can be employed:

1. Visual observation of the area as a whole; in which the observer makes a mental picture of the location, distribution and relative intensity of the infestation.
2. Sample strip counts; in which the observer tallies all conspicuous dead trees within his range of vision between certain markers on the plane as it flies over a course of known length.

3. Aerial photographs of sample plots; in which an aerial camera, equipped with a fast lens, "G" color filter and panchromatic plates, is used, and vertical "shots" are taken of sample plots at an elevation of about 5,000 feet. The color filter causes the yellow foliage of the dead trees to stand out white, in striking contrast to the rest of the trees, so that the number of such trees on the sample plot can be easily counted and the average run of infestation determined.

The three methods can usually be combined during one flight over an area, so that in a few hours' time an estimate can be secured of the insect damage over a large area--work which would normally take several weeks to do on the ground.

In September I had the opportunity of making such a flight over the Happy Camp District of the Modoc National Forest. The District 5 air-patrol plane, piloted by Captain M.S. Boggs, was detailed to the project through the courtesy of the Forest Service, and to the Forest Supervisor, George W. Lyons, was allotted the task of serving as weather prophet and advise Mather Field when air and light conditions would be satisfactory for the flight.

Monday, the twenty-sixth, dawned bright and clear, and Supervisor Lyons, trusting to his luck as an amateur Father Ricard, telephoned the field for the plane to come on. In the next two hours, while I negotiated forty miles of mountain road from camp to Alturas, the plane covered the two hundred miles from Sacramento to Alturas and landed on the field only a few minutes after me. Following a hasty lunch we donned helmets and goggles, strapped on the "chutes", wound up the DH-4, and in a moment Captain Boggs had it climbing skyward, like a Chalcophora scared from a bug tree, and heading toward Happy Camp Mountain.

On reaching the area we circled Happy Camp lookout tower and headed toward Timber Mountain. When over the plots to be photographed I unbuckled the safety belt, knelt on the seat and hung out over the side of the fuselage in preparation to shoot at the proper moment. Captain Boggs maneuvered the plane over the plot and at a given signal shut off the motor, turned the nose up, tilted the plane to the side (a most disconcerting procedure), and as the plane settled and the vibration of the propeller ceased I clicked the camera and climbed back to safety to change plates and prepare for the next shot. After taking a dozen exposures, both verticals and obliques, we headed back to Alturas and landed safely at the field, after spending an hour and a half in the air and covering an area that would have taken a week to survey on the ground.

The first day we used a "G" filter with ordinary panchromatic plates, but upon developing them found that the negatives were too weak for the light conditions that prevailed on the area. You see, the Supervisor was almost as good a prophet as a Native Son, and so it started to cloud up by noon and was quite overcast by four o'clock.

And the next day it rained!

On the third day Captain Boggs had to return to Hather Field and so a second flight was attempted, even though storm clouds were drifting overhead and the chances of taking pictures looked none too good. However, we hopped off at eleven o'clock, sailed up through the clouds and bumped over the air holes, and soon were back over the area. By a great stroke of luck the clouds now cleared away, and the sun shone bright and clear and gave us a wonderful opportunity to get some clear pictures. This time we had equipped the camera lens with a "K-2" filter, and a dozen exposures were again made, with better coordination of signals than had prevailed the first day. We spent about two hours over the area, obtaining a wonderful view of the country as a whole, and I discovered two heavily-infested areas that I had not seen from the ground. On returning to Alturas the plates were developed and proved to be excellent pictures of the country, but the filter had not given as much contrast to the "bug" trees as might be desired.

Each experience of this kind gives us a better understanding of the possibilities of the airplane in forest insect survey work and also the technique of the methods which will give the most satisfactory results. For instance, on this flight we learned that the "G" filter will have to be used to bring out the greatest contrast in the yellow trees, also that except under very favorable light conditions a hypersensitized panchromatic plate will be necessary. Exposures of 1/120 or 1/155 of a second are required on account of the vibration and speed of the plane. Oblique views are best secured at elevations of less than 2000 feet, for if one looks down at too sharp an angle too much of the ground between the trees comes into view, and the area doesn't look like a forest at all but more like a scattered brush flat. The vertical shots should be taken at an elevation of from 4000 to 6000 feet above the forest, so that the pictures will cover at least 40 acres of ground surface and yet not be so far away that the infested trees cannot be distinguished. There are also many little problems connected with the taking of the pictures, such as getting the light to the rear, proper coordination between cameraman and pilot, operation of the camera etc., which can be gained only through experience.

One of the finest things about the air method is the general picture one gets of the situation as a whole. The relative intensity and distribution of infestation on different parts of an area is very striking and impressive. When an area has been seen from the air, you have the satisfaction of feeling that nothing has been missed and that your estimate of the situation is a comprehensive one.

Airplanes as an aid to forest insect reconnaissance have already proved themselves of value. Who knows how soon it will be before every forest insect field station will include in its personnel a pilot and a trained air bug observer, and on its property list a late model "Spirit of Dendroctonus"?

1927 CONTROL WORK ON COLORADO NATIONAL FOREST
SHOWS GOOD RESULTS

I have covered a great portion of the area controlled in the spring campaign, and have found no new infestations except along the borders of the control area. These new infestations are being taken care of by the fall work, and I am very glad to report that the spring control project can be classed as highly successful in eliminating the Black Hills beetle from the areas covered.

Arthur L. Nelson.

LINE SLASH AS AN AID TO INSECT CONTROL

It has been fairly well established that in general western yellow pine slash is not a menace as a breeding ground for primary forest insects. A recently completed study on a special phase of the problem shows that right-of-way or "line" slash may be so handled as actually to reduce the numbers of the western pine barkbeetle, the principal primary insect breeding in yellow pine slash.

The study was made on the Big Creek district of the Sierra National Forest, on a clearing for a new power line of the Southern California Edison Company. The area is in the lower yellow pine belt, with an open stand and very little brush.

The following five different methods of treatment were used:

1. Felled only, limbs left on
2. Felled and limbs cleared away, leaving trunk exposed
3. Felled, limbed and trunk covered with brush
4. Felled, limbed, covered and burned
- 5a. Felled, limbed, lower half covered with brush
- 5b. " " " " " " " and burned

Six trees between 16 and 34 inches in diameter were studied in group. They were felled on different exposures during May and June. The results are quite clearcut and again demonstrate the lack of any appreciable "breeding up" of the western pine beetle in this type of slash, regardless of how it is treated. Where the trees were felled only, the number of D. brevicornis emerging was slightly greater than the number that attacked. In all the other groups the number of beetles emerging was much smaller than the number that attacked, so that there resulted an actual reduction in the beetle population of the area.

Considering both the western pine beetle and the engraver beetle--Ips confusus (Lec.)--the only other insect found in this slash that might be considered primary, the best treatment is either felling and limbing only, or felling, limbing and burning.

H.L.P.

WHY DID IT VARY?

In 1926 the number of overwintering adults of the mountain pine beetle in western Montana was quite large. In contrast, the season of 1927 showed a very small number overwintering--much less than one per cent. Can we blame the weather for that variation? The 1925-26 season was unusually mild; cold weather did not come until late in the fall of 1925, and then it was very mild. In 1926 spring came early and was very warm. The season of 1926-27 was much more severe, the snowfall being heavy and the spring late and cold. Maybe therein lies the answer.

A.L.G.

NUMBER OF FOREST ENTOMOLOGY STUDENTS INCREASES AT SYRACUSE

Dr. M.W. Blackman, head of the Department of Forest Entomology, New York State College of Forestry, Syracuse University, writes as follows: "Have larger classes than I have had for years. Thirty-four are in the elective course, where the usual number is ten or less. Eight Juniors also have elected to major in Forest Entomology."

AN EGG GALLERY RECORD

The Coeur d'Alene Station is willing to let Mr. Miller's record for the longest pitch tube stand for the present. However, we have a record for an egg gallery that we should like to submit. On white pine trees treated in 1927 several mountain pine beetle egg galleries were measured, the longest of which was 46 inches in length. Will this one do?

J.C.E.

(The mountain pine beetle is a piker. "J.E.P.", in the WESTERN FOREST INSECT NEWS for December 1925, records a Dendroctonus valens gallery 15 feet long by actual measurement.--Editor)

IS COLOR A DEFINITE INDICATION OF MATURITY?

During the past summer, while examining newly-attacked lodgepole pine in the Western Montana infestation, many adult mountain pine beetles were observed that were light brown in color. Of the number observed a few were very light brown, but most of them, though darker brown, were of a decidedly lighter hue than we have become accustomed to associate with mature adults. No difference from their neighbors was noted in the activity of these insects in gallery construction.

A.L.G.

HOW DID THE CLIFF DWELLERS CONTROL BARKBEETLES?

The ruins of the Mesa Verde National Park contain considerable evidence to show that the use of wood was a very important factor in the life of the prehistoric cliff dweller. From the short-bodied forests of juniper and pinyon that covered the mesas, they cut the timbers for the floor joists and rafters of their apartment-like dwellings and numerous ceremonial "kivas". All the timbers that have been preserved in the ruins were cut and fashioned with no other implement than the crude stone ax. The perseverance of the cliff dweller must have far exceeded his inventive abilities.

During the past few seasons an epidemic of Ips beetles has caused the extensive dying of pinyon trees over a large part of the Mesa Verde region. At the request of the Park Service Dr. Craighead and I made a brief examination of conditions in August 1927. In addition to the Ips outbreaks we found considerable damage to juniper foliage by a red spider. Archaeologists tell us that years of drought must have occurred during the period when the cliff dwellers occupied the numerous ruins of southern Colorado and New Mexico, as all evidence points to the fact that provision for dry years entered largely into the methods of living and agriculture of this primitive race. It seems reasonable to assume that former cycles of dry seasons were accompanied by barkbeetle epidemics similar to those that occur in the region today. But the idea of a control project in which the bug trees of prehistoric times were felled, limbed and peeled with a stone hatchet does not seem to fit into the picture. That job is difficult enough with an Atkins crosscut saw and a double-bitted steel ax. J.M.M.

EASTERN SPRUCE AFFECTED BY WHITE PINE WEEVIL

The October issue of the NEWS LETTER had an item on "The Engelmann Spruce Weevil in Glacier Park". Of particular interest to the writer is the fact noted in this item that it is a rare thing to see an Engelmann spruce with a forked top. In the northeast all the spruces, including the imported Norway spruce, extensively used in forest planting, are liable to infestation by the white pine weevil. The Norway spruce is, next to the white pine itself, most seriously affected. In all these species, except when the affected tree is growing in the open, it is only rarely that a forked top due to weeviling is found. The new leader will usually have attained supremacy and will be nearly straight before the end of the same growing season. At times the new leader apparently rises from what appears to be an adventitious bud in the axil of a needle at the highest point of the living portion of the shoot, and is not the lateral, which is still lower down. This rarely if ever happens with the pines when they are affected. H.J. MacAloney.

ANOTHER ANGLE OF THE SLASH PROBLEM

Early this season Mr. Woodbury called our attention to the insect situation on both the old and the recent cutover areas of the eastern Tahoe. In September of this season I made a brief examination of an area near Loyalton, Calif., and was forcibly impressed with the fact that there are always two sides to every question, particularly that of slash disposal.

In 1910 I made a trip through this same region with Ranger Babbitt of the Sierraville District. At that time I noticed small groups of yellow pine reproduction killed by Ips immediately around brush piles on a Forest Service sale area. The brush piles certainly seemed to have some connection with this killing. On the trip I made in September 1927 I observed the same sort of injury on a much more impressive scale. Near the town of Loyalton, several small logging operations had been carried out in 1926 and discontinued during the summer. Around these areas large groups of young trees were attacked by Ips in the fall of 1926. Some of these groups were so large as to make it appear as though a fire had run through the area. Obviously the trees had been killed by beetles coming out of the logging slash. However, the outbreak was shortlived. Scarcely a single tree could be found in the vicinity of these groups that had been attacked by Ips beetles in 1927.

A similar situation was examined by Keen on the Modoc in 1923. In this case also the outbreaks occurred on a very poor site where logging was discontinued in midseason.

Person's and Patterson's studies have shown conclusively that slash conditions ordinarily do not cause aggressive barkbeetle infestations. But the exception is necessary to prove the rule, and these seem to be the special cases where we can expect trouble from barkbeetles that breed in slash. However, the remedy under these conditions does not appear to be slash disposal, as the fire hazard would prevent burning the slash in time to destroy the Ips broods that emerged in the late summer. If logging is done late in the fall and the slash burned during the winter, the possibility of a breeding ground for an Ips epidemic would be eliminated. J.M.M.

PLANNING FOR 1928 CONTROL WORK IN DISTRICT 1

Mr. C.S. Webb, Logging Engineer of District 1, who is in charge of the Big Hole Basin control project, is spending a month at the Coeur d'Alene Station. During this time Mr. Webb and Mr. Evenden will prepare a report on the 1927 control work and a plan for the continuation of the above project in 1928. J.C.E.

THE PREHISTORIC DAYS OF FOREST ENTOMOLOGY

The division of Forest Insects of the Bureau of Entomology is now twenty-five years old. It was organized July 1, 1902, as a separate office of the then Division of Entomology. Dr. A.D. Hopkins was brought from the West Virginia Agricultural Experiment Station and placed in charge. J.L. Webb, now of Cotton Insect Investigations, was then Assistant Forest Expert under George B. Sudworth of the Bureau of Forestry, and was detailed as assistant to Dr. Hopkins on July 1, 1902. November 1, 1902, H.E. Burke was transferred from the Codling Moth Investigations of the Division of Entomology, appointed Assistant Forest Expert under Mr. Sudworth, and detailed to Dr. Hopkins. February 1, 1903, W.F. Fiske, Assistant State Entomologist of Georgia, was appointed Temporary Field Agent of the Division of Entomology and also detailed to Dr. Hopkins.

With this organization the work of systematically investigating the forest insects of the United States started in full swing with the field season of 1903. Dr. Hopkins took as his special field the Central and Eastern States, Fiske the South, Webb the Rocky Mountain States and Burke the Pacific States.

At the present time Burke is the only one remaining with Forest Insects. Dr. Hopkins is in charge of Bioclimatic Investigations for the Bureau of Entomology, Webb is in the Division of Cotton Insect Investigations and Fiske, when last heard from, was with the British Imperial Bureau of Entomology in South Africa. Twenty-five years does change things--let us hope for the better.

FOREST ENTOMOLOGIST ASSIGNED TO CALIFORNIA EXPERIMENT STATION

Assistant Entomologist H.L. Person took up quarters with the California Experiment Station at Berkeley on November 1. Mr. Person's assignment will provide for an important phase of coordination of work between the Bureau of Entomology Station at Palo Alto and the California Experiment Station of the Forest Service. The greater part of Person's time will be given to entomological studies in which the Experiment Station is immediately interested. The Experiment Station has provided funds for a temporary assistant to work with Person in the compilation of the results of the western pine beetle tree selection studies. George R. Struble, who worked with Person last season, has been appointed to take up the Assistant work in January.